Amendments to the Specification

Please replace paragraph [0011] with the following amended paragraph:

[0011] The data collection system operates in the following manner (Figs. 1, 2). Comparators 9 pick out the moments when network voltage 18 becomes equal to zero 19, thus forming a sequence of time marks 20, practically synchronous for the whole system, which is used for primary (character) synchronization for data transmission from slave units to the main one. On operation of primary sensor 17 microcontroller 14 begins to play back periodically through DAC 8 its signal table which is stored in a permanent memory and is unique for each slave unit 2. The signal table playback time is equal exactly to one half-cycle of network voltage and the playback starting point is defined by the instant of comparator 9 operation which takes place when the network voltage in line 3 is equal to zero. A signal from DAC 8 output is further filtered by band-pass filter 6 to remove the out-of-band components and through protection and signal tracking device 4 is delivered to network line 3. Signal table 15 is unique for each slave unit 2. A set of signal tables has been synthesized before the network for data collection according to the present method is developed. A candidate-set of 96 numbers φ_k from the interval [0 . . . 2π] is generated by a random-number or pseudorandom number generator. This set is further used to synthesize a signal of the type

$$s(t) = \Sigma \sin(2\pi \cdot f_m \cdot t + \varphi_m) \text{ where}$$

m=0 . . . 95, f_m -- 96 harmonics evenly spaced at interval of 781.25 Hz within the system operating frequency band (20 . . . 95 kHz). Signals s(t) with a good value of the crest factor and their phase sets are stored in table form for further use. As practice shows, the probability <u>is rather high</u> that a signal to be synthesized from a given random set of 96 phase differences will have the crest factor being only <u>4dB worse than the crest factor of pure sine wave. A signal from a slave</u> unit transmitter passes through a segment of power network 3 where noise is added to it. The signal is then attenuated, subjected to different kind of linear and nonlinear distortion and enters network main unit 1 where it passes through tracking device 4, band-pass filter 5 and is converted to digital form in ADC 6. Digital signal processor 13 stores all AFC samples of the given bit interval and performs

a Fourier transform on them. This results in a set of complex Fourier coefficients but only those 96 coefficients with frequencies fitting those on which a slave unit transmits its data are used further. In what follows denote them by C_m, where m=0 . . . 95. At the next stage the following products are found:

$$D_k = C_k \cdot (C_{k-1})^* \cdot \exp(-j \cdot \Delta\varphi_k), \text{ where}$$

$\Delta\varphi_k = \varphi_k - \varphi_{k-1}$, φ_m -- a corresponding phase set taken from phase tables 12 which was used to generate a signal table for a given slave unit, k=1 . . . 95, m=0 . . . 95, asterisk denotes complex conjugation. Then for each slave unit an estimate as the following sum is calculated:

$$S = \Sigma \, \mathrm{sign}\{\mathrm{Re}(D_k)\}.$$

These operations imply that products $C_k \cdot (C_{k-1})^*$ are complex vectors with rotation angles being equal to phase differences of adjacent harmonics in the received signal, D_k values are the same vectors rotated to the ~~actual~~ real axis through an angle exactly opposite to the angle used for modulation of these harmonics in a slave unit transmitter. Thus, if a "correct" signal from a slave unit is found in a given bit interval, its corresponding set of complex values D_k is being concentrated along the ~~actual~~ real axis and the sum S will show a greater positive shift. If a given bit interval has no "correct" signal from a slave unit, the value S, as can be easily seen, will be a normally distributed random quantity with zero mean ~~deviation~~ and standard deviation of about 10. Determination of the signal from a given slave unit is completed by comparing the sum S with some predetermined and ~~rather~~ sufficiently large threshold.